

Final Review Multiple Choice Problems #7

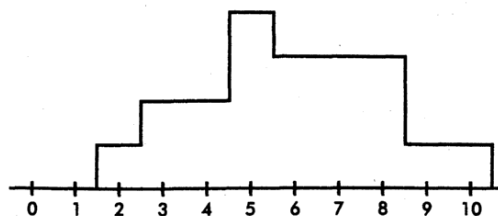
18. Following are parts of the probability distributions for the random variables X and Y .

x	$P(x)$	y	$P(y)$
1	.1	1	?
2	?	2	?
3	?	3	.2

If X and Y are independent and two joint probabilities are $P(X = 1, Y = 1) = .025$ and $P(X = 3, Y = 3) = .08$, what is $P(X = 2, Y = 2)$?

- (A) .115
 (B) .275
 (C) .333
 (D) .725
 (E) .895
19. One medical report suggested that among a sample of 239 cesarean surgical procedures, 83 were unnecessary. What is a 99% confidence interval estimate for the proportion of cesareans that are unnecessary?
- (A) $.347 \pm .002$
 (B) $.347 \pm .060$
 (C) $.347 \pm .079$
 (D) $.347 \pm .227$
 (E) $.347 \pm .476$

20. Following is a histogram of the numbers of ties owned by bank executives.



Which of the following statements are true?

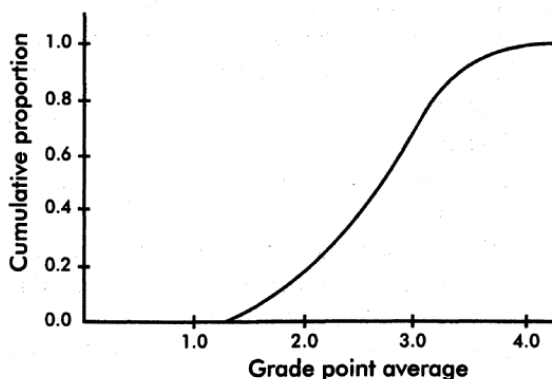
- I. The median number of ties is five.
 II. More than four executives own over eight ties.
 III. An executive is equally likely to own fewer than five ties or more than seven ties.
- (A) I only
 (B) II only
 (C) III only
 (D) I and III
 (E) I, II, and III

21. Exams I, II, and III have mean results of 67, 72, and 76, respectively, and standard deviations of 11, 8, and 5, respectively. Mary takes exam I, John takes exam II, and Sarah takes exam III. They each score 83. Rank them from lowest to highest results according to z-scores.
- (A) John, Sarah, Mary
 (B) Mary, John, Sarah
 (C) Sarah, John, Mary
 (D) John, Mary, Sarah
 (E) Mary, Sarah, John

22. Company I manufactures bomb fuses that burn an average of 50 minutes with a standard deviation of 10 minutes, while company II advertises fuses that burn an average of 55 minutes with a standard deviation of 5 minutes. Which company's fuse is more likely to last at least 1 hour? Assume normal distributions of fuse times.
- (A) Company I's, because of its greater standard deviation
 - (B) Company II's, because of its greater mean
 - (C) For both companies, the probability that a fuse will last at least 1 hour is 15.9%
 - (D) For both companies, the probability that a fuse will last at least 1 hour is 84.1%
 - (E) The problem cannot be solved from the information given.
23. Which of the following is *not* important in the design of experiments?
- (A) Control of confounding variables
 - (B) Randomization in assigning subjects to different treatments
 - (C) Use of a lurking variable to control the placebo effect
 - (D) Replication of the experiment using sufficient numbers of subjects
 - (E) All of the above are important in the design of experiments.
24. A historian believes that the average height of soldiers in World War II was greater than that of soldiers in World War I. She examines a random sample of records of 100 men in each war and notes standard deviations of 2.5 and 2.3 inches in World War I and World War II, respectively. If the average height from the sample of World War II soldiers is 1 inch greater than that from the sample of World War I soldiers, what conclusion is justified from a two-sample hypothesis test where $H_0: \mu_1 - \mu_2 = 0$ and $H_a: \mu_1 - \mu_2 > 0$?
- (A) The observed difference in average height is significant.
 - (B) The observed difference in average height is not significant.
 - (C) A conclusion is not possible without knowing the mean height in each sample.
 - (D) A conclusion is not possible without knowing both the sample means and the two original population sizes.
 - (E) A two-sample hypothesis test should not be used in this example.
25. Which of the following statements about residuals are true?
- I. The mean of the residuals is always zero.
 - II. Influential scores have large residuals.
 - III. A definite pattern in the residual plot is an indication that a nonlinear model should be tried.
- (A) II only
 - (B) I and II
 - (C) I and III
 - (D) II and III
 - (E) I, II, and III
26. Four pairs of data are used in determining a regression line $y = 3x + 4$. If the four values of the independent variable are 32, 24, 29, and 27, respectively, what is the mean of the four values of the dependent variable?
- (A) 68
 - (B) 84
 - (C) 88
 - (D) 100
 - (E) The mean cannot be determined from the given information.

27. According to one poll, 12% of the public favor legalizing all drugs. In a random sample of six people, what is the probability that at least one person favors legalization?
- (A) .380
(B) .464
(C) .536
(D) .620
(E) .844
28. A geologist claims that a particular rock formation will yield a mean amount of 24 pounds of a chemical per ton of excavation. His company, fearful that the true amount will be less, plans to run a test on a random sample of 50 tons. They will reject the 24 pound claim if the sample mean is less than 22. Suppose the standard deviation between tons is 5.8 pounds. If the true mean is 20 pounds of chemical, what is the probability that the test will result in a failure to reject the incorrect 24 pound claim?
- (A) .0073
(B) .4927
(C) .5073
(D) .8200
(E) .9927
29. A telephone executive instructs an associate to contact 104 customers using their service to obtain their opinions in regard to an idea for a new pricing package. The associate notes the number of customers whose names begin with A and uses a random number table to pick four of these names. She then proceeds to use the same procedure for each letter of the alphabet and combines the $4 \times 26 = 104$ results into a group to be contacted. Which of the following are true statements?
- I. Her procedure makes use of chance.
II. Her procedure results in a simple random sample.
III. Each customer has an equal probability of being included in the survey.
- (A) I only
(B) I and II
(C) I and III
(D) II and III
(E) I, II, and III

30. The graph below shows cumulative proportions plotted against GPAs for high school seniors.



What is the interquartile range?

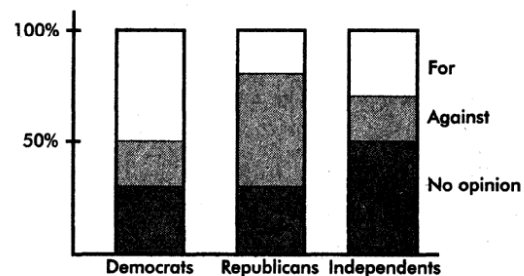
- (A) 0.85
(B) 2.25
(C) 2.7
(D) 2.75
(E) 3.1
31. PCB contamination of a river by a manufacturer is being measured by amounts of the pollutant found in fish. A company scientist claims that the fish contain only 5 parts per million, but an investigator believes the figure is higher. In which of the following intervals is the P -value found if six fish are caught and show the following amounts of PCB (in parts per million): 6.8, 5.6, 5.2, 4.7, 6.3, and 5.4?
- (A) $P < .01$
(B) $.01 < P < .025$
(C) $.025 < P < .05$
(D) $.05 < P < .10$
(E) $.10 < P$

32. In a certain city 6% of teenagers are married, 25% of married teenagers have children, and 15% of unmarried teenagers have children. What is the probability that a teenager has a child? If a teenager has a child, what is the probability that the teenager is not married?
- (A) .156, .904
 (B) .200, .500
 (C) .200, .940
 (D) .400, .500
 (E) .400, .940
33. In general, how does tripling the sample size change the confidence interval size?
- (A) It triples the interval size.
 (B) It divides the interval size by 3.
 (C) It multiplies the interval size by 1.732.
 (D) It divides the interval size by 1.732.
 (E) This question cannot be answered without knowing the sample size.
34. Is hair loss pattern related to body mass index? One study on 769 men (*Journal of the American Medical Association*, February 24, 1993, page 1000) showed the following numbers:

		Hair loss pattern		
		None	Frontal	Vertex
Body mass index	<25	137	22	40
	25–28	218	34	67
	>28	153	30	68

The χ^2 -value is 4.18. At the 5% and 10% significance levels is there a relationship between hair loss pattern and body mass index?

- (A) There is sufficient evidence of a relationship at both the 5% and 10% levels.
 (B) There is sufficient evidence of a relationship at the 5% level but not at the 10% level.
 (C) There is sufficient evidence of a relationship at the 10% level but not at the 5% level.
 (D) There is not sufficient evidence of a relationship at either the 5% or the 10% level.
 (E) There is not enough information to answer this question.
35. A study on school budget approval among people with different party affiliations resulted in the following segmented bar chart:



Which of the following is greatest?

- (A) Number of Democrats who are for the proposed budget
 (B) Number of Republicans who are against the budget
 (C) Number of Independents who have no opinion on the budget
 (D) The above are all equal.
 (E) The answer is impossible to determine without additional information.